Abstract:

A new and very promising application of auto-thermal reactors is the coupling of endothermic and exothermic reactions where the product of the endothermic reaction is the desired one. Therefore, in this work, a reactor in which oxidative coupling of methane (OCM) and steam re-forming of methane (SRM) reactions take place simultaneously was modeled. The results were obtained in a wide range of different conditions such as inlet feed, inlet temperature, portions of OCM and SRM catalysts, and inlet velocity. In selection of the catalysts, more attention was drawn to prevent re-forming of OCM products. The main parameters of each reaction under different conditions such as conversion of the feed components, products selectivity and yield, temperature in the length of reactor, and component's concentration in the reactor were considered in course of this study. The results revealed that simultaneous OCM and SRM reactions in one reactor will tend to be auto-thermal, and the waste of energy will be reduced. The results also show that complete conversion of water and majority of methane and oxygen will decrease the amount of unwanted products at the reactor's discharge-a constraint that exists in single reactors of each reaction specially OCM.